

## SIDEBAR

### Trends in High-Performance Computing

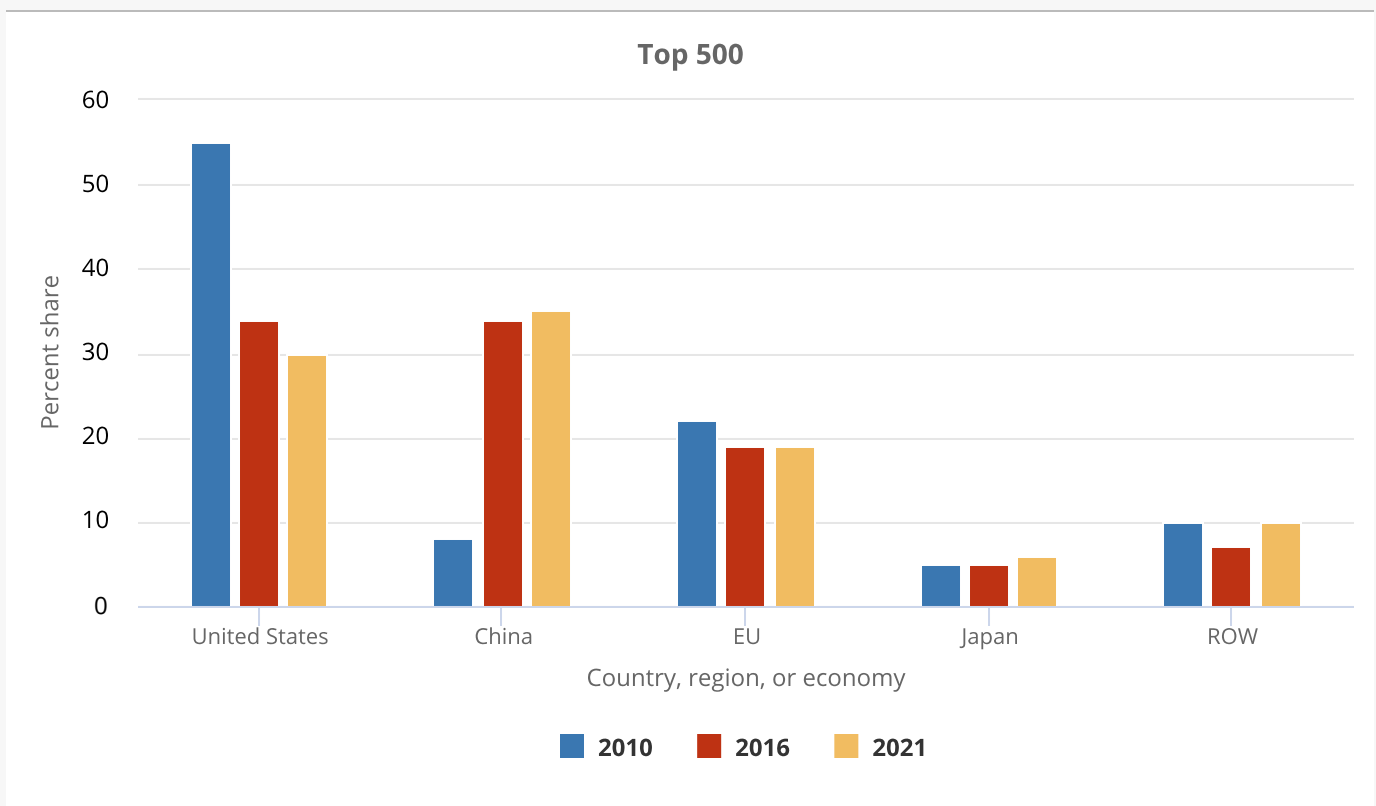
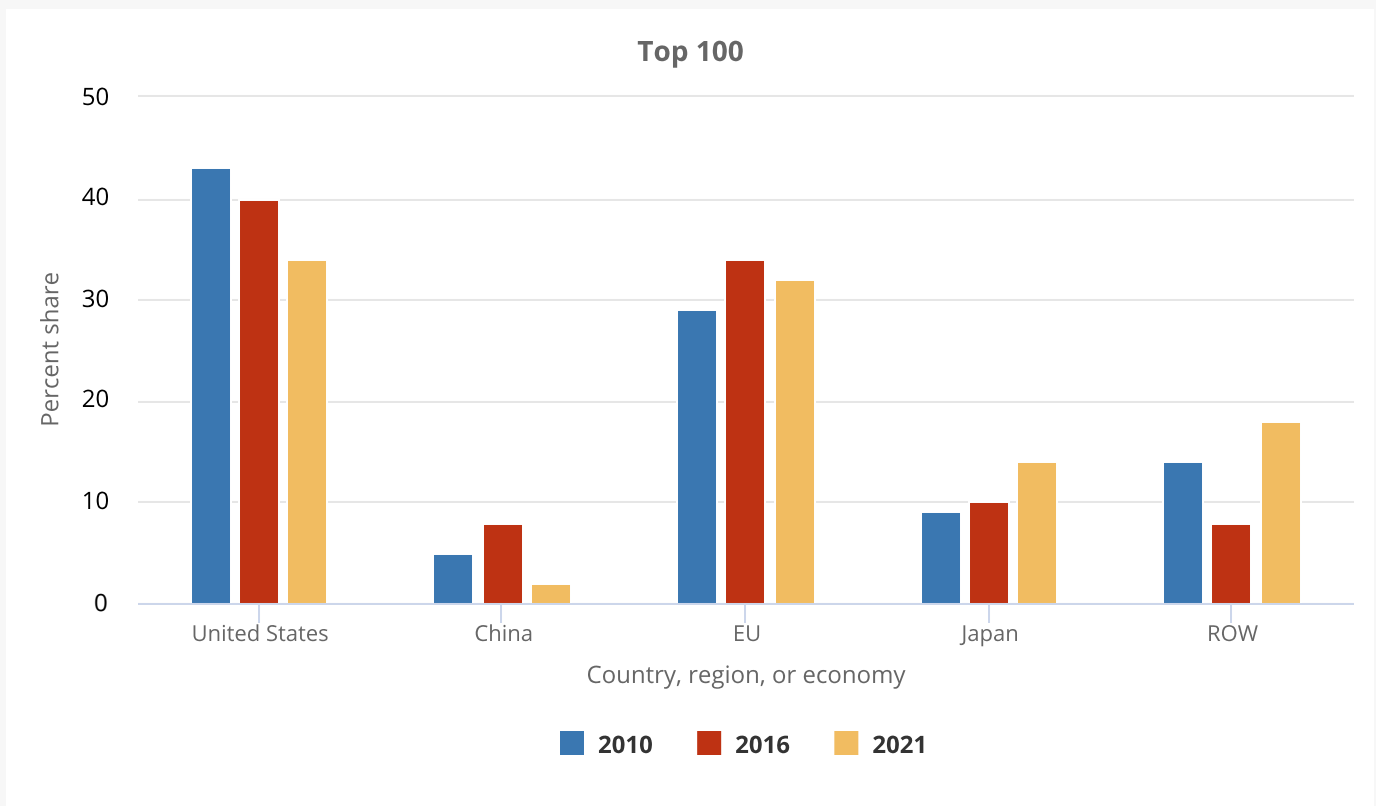
The TOP500, an organization of computer scientists and industry specialists, tracks and reports trends in high-performance computing (<https://www.top500.org/>). It provides a semiannual update on the world's top 500 supercomputers, including information on country of origin, performance, type of application, and technology.

According to its November 2021 update, the Japanese 442-petaflop Fugaku supercomputer remains at the top of the 10 most powerful supercomputers,\* followed by two U.S. systems: Summit at the Oak Ridge National Laboratory, and Sierra at Lawrence Livermore National Laboratory. The United States has three more computers in the top 10 list: Selene; Voyager-EUS2; and the National Energy Research Scientific Computing Center's Perlmutter, which recently made this list. China holds two slots in the top 10 list, with the Sunway TaihuLight supercomputer at the National Supercomputing Center in Wuxi ranked fourth, and the Tianhe-2A in the National Supercomputer Center in Guangzhou ranked seventh. The remaining two spots are held by Germany (JUWELS Booster Module) and Italy (HPC5).

China leads overall by number of systems (173 systems in 2021, or a 35% share) and has become dominant in the TOP500 list in a relatively short period of time (Figure KTI-G). China's share has increased from 8% in 2010 to 35% in 2021. During the same period, the U.S. share has declined from 55% to 30%.

Figure KTI-G

**Top-ranked supercomputers, by region, country, or economy: Selected years, 2010–21**



EU = European Union; ROW = rest of world.

**Note(s):**

EU includes the United Kingdom for comparability with earlier data.

**Source(s):**

TOP500, November 2010, 2016, and 2021 reports, <https://www.top500.org/>, accessed 30 November 2021.

*Science and Engineering Indicators*

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Despite its notable achievements, China's dominance is largely limited to less-advanced supercomputers that conduct routine activities, such as running Web-based or back-office applications (Feldman 2017). China has made little progress to increase its presence in the TOP100 list, which consists of the most sophisticated supercomputers used in scientific research, such as processing and simulating quantum mechanics, weather forecasting, climate research, oil and gas exploration, and molecular modeling and physical simulations. The United States dominates the TOP100 list, accounting for a third of these supercomputers (Figure KTI-G).

\* One petaflop is equivalent to  $10^{15}$  floating-point operations per second.